<Poster Session>Classification of stroke pattern of dugongs in Dungonab Bay, Sudan by using an acoustic data logger

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Classification of stroke pattern of dugongs in Dungonab Bay, Sudan by using an acoustic data logger

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Abstract

We conducted a series of acoustic tagging of dugongs to observe individual behavior. A male dugong was equipped with an underwater recorder, a GPS logger, a VHF transmitter, and a time-scheduled releaser in June, 2012, in Dungonab Bay in Sudan. Underwater sound, location, temperature and depth of tagged dugongs were obtained. A male dugong spent 96 % of their time in shallow waters (< 4 m). There were sudden deep dives (> 20 m) with the deepest dive at 40 m. Sounds of the dugong's tail stroke was detected by taking energy sum between 0 – 500 Hz at 50-ms interval. Distribution of inter-stroke interval showed tri-modal distribution with each peak characterized by acoustic energy of the tail stroke. Hence the stroke pattern of the dugong was categorized into 1) Slow and strong strokes and 2) weak and fast strokes. The acoustic energy and intervals of the tail stroke can therefore be assumed as quantity of motion. The quantity of motion decreased during the night and increased before dawn and dusk. This study suggests that daily energy expenditure by a dugong can be estimated by using the acoustic data loggers.

Keywords*: data logger, acoustic tagging, tail beat, stroke pattern*

Introduction

In coastal Sudan, local diets and livelihoods rely on reef fishing. An offshore conservation zone has been established to protect rich coral ecosystems in 2005. This new coastal regulation may instead endanger local livelihoods, as it will likely prohibit use of gillnets due to the fact that they can also entangle the endangered dugong (*Dugong dugon*). It is therefore important to study human-animal interaction in detail.

Biologging is now widely applied to various animals, such as seals, whales, turtles, sea birds and fish. This technique provides the most precise behavior of the animals tagged with data-loggers and transmitters.

In this study, we conducted a series of acoustic tagging of dugongs to observe individual diving behavior.

Material and Methods

A series of field surveys were conducted in the northern part of Dungonab Bay, Sudan (N21^{o}6.296', E37^{o}7.083'). According to the local researcher, Dr. Abdelmoneim Karamalla Gaiballa, the densest population of the dugongs is found in the Dungonab Bay. We decided to focus on the northern half of the bay that are shallower than the southern half and so that more dugongs are expected to be found. Observations were conducted from June 21 to July 15, 2012.

We applied "Rodeo method" for catching dugongs (Lanyon et al., 2006). This technique is well established by Australian researchers who caught more than 1000 dugongs to date. The Rodeo method started by chasing a dugong, then 4 people jumped to the targeted dugong. A package of tracking devices is then attached to the tail of the dugong. The tracking device consists of a GPS logger (MK10-F, Wildlife Computers Co., Ltd.), a mini acoustic recorder (AUSOMS-mini, Aqua Sound Co., Ltd.) and a VHF transmitter (Advanced Telemetry Systems Co., Ltd.), and and a time-scheduled releaser (RT-1-168, Little Leonard Co., Ltd).

A male dugong was captured in a small embayment called 'Atof' in Dungonab Bay on July 1, 2014. The devices came off before the scheduled time again because of the weak link and was found floating at exactly the same

place as the capture site. Temperature and depth of the GPS logger was recorded for 45 hours for this animal.

Sounds of the dugong's tail stroke were detected by taking energy sum between 0 – 500 Hz at 50-ms interval.

Results and Discussion

Underwater sound, location, temperature and depth of tagged dugongs were obtained. A male dugong spent 96 % of their time in shallow waters (< 4 m). There were sudden deep dives (> 20 m) with the deepest dive at 40 m. Distribution of inter-stroke interval showed tri-modal distribution with each peak characterized by acoustic energy of the tail stroke. Hence the stroke pattern of the dugong was categorized into 1) Slow and strong strokes and 2) intermediate strokes, and 3) weak and fast strokes (Fig. 1).

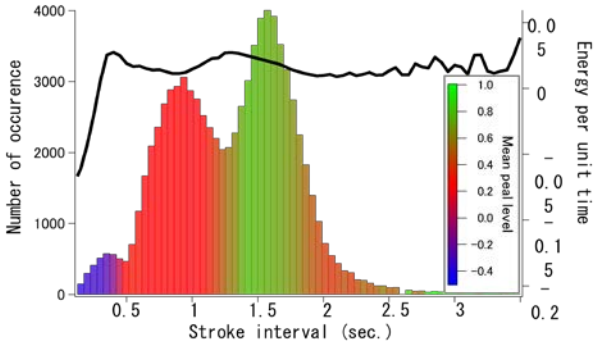

Fig. 1. Frequency distribution of stroke interval of the tagged dugong showed distinctive tri-modal distribution. The stroke patterns were categorized into 1) Slow and strong strokes and 2) intermediate strokes, and 3) weak and fast strokes

The acoustic energy and intervals of the tail stroke can therefore be assumed as quantity of motion. The quantity of motion decreased during the night and increased before dawn and dusk. This study suggests that daily energy expenditure of a dugong can be estimated by using the acoustic bio-logging.

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Acknowledgements

This study required the help of many people. We offer our sincere thanks to Nakamura R., Adel M. for assisting the fieldwork. This study was partly supported by the Sasagawa Foundation.

We thank Dr. Mohamed Elamin Hamza, Vice-Chancellor, and Dr. Moamer Eltayeb Ali, Dean of Faculty of Marine Science and Fisheries, Red Sea University for the arrangements for research permissions from multiple organizations. We are grateful for the kind acceptance for this study by the Wildlife conservation office in Port Sudan. We also thank Abdelmohsin, Mohammadyousif from Red Sear University for their extensive help in the field work. Eisa, the captain, Taher, and Indeel of the Dungonab village also helped our field survey greatly.

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